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## **EUROBAT GUIDE FOR THE SPECIFICATION OF VALVE REGULATED LEAD-ACID STATIONARY CELLS AND BATTERIES**

# **EUROBAT**

This publication is a document commissioned by EUROBAT to increase the awareness, understanding and use of valve regulated lead acid batteries for stationary applications. More specifically, the document provides the 'User' with guidance in the preparation of his Purchasing Specification and in this revision particular reference is made to General Definitions, Product Characteristics, Design Life, Service Life, Safety and Operational Recommendations

## GENERAL DEFINITIONS

### VALVE REGULATED CELLS AND BATTERIES

A cell or battery which is closed under normal conditions by a non-return (control) valve which allows the escape of gas if the internal pressure exceeds a predetermined value.

The valve shall not allow gas (air) to enter into the cell and the maximum pressure reached inside the cell under any or limited sets of circumstances can be indicated by, or requested from the manufacturer.

The cells cannot receive additions to the electrolyte. This description applies equally to 'Absorbed (AGM)' or 'Gelled' electrolyte.

## PRODUCT CHARACTERISTICS

### QUALIFICATION

In the absence of any other agreement between the manufacturer and the 'user', the following characteristics may be qualified by test methods in the International Specification, IEC 60896-21/22.

Where a test method is appropriate the text is marked with an asterisk\*

### FLOAT

Most stationary batteries are electrically 'floating' across the DC supply in parallel with the rectifier and the load and thereby provide uninterrupted power to the system.

The manufacturer shall state the recommended float voltage limits, as defined in IEC 60896-21/22.

### RETENTION

Charge retention is important to 'Users' who normally hold stocks of batteries.

Charge retention determines the frequency for recharging batteries held in storage.

\*Manufacturers shall state the charge retained.

### CAPACITY

Unless otherwise declared by the manufacturer, the Nominal Capacity is defined at 10 hours (C10) at 20°C to 1.80 Volts per cell (Vpc).

Users should note that the numerical value of the capacity quoted is dependant upon the rate, temperature and end voltage of the discharge.

For application purposes other rates of discharge may be requested for capacity.

\*User acceptance capacity tests may be agreed separately with the manufacturer and will be subject to contractual negotiation.

### CYCLES

This characteristic gives a measure of the endurance of the battery to repeated charge and discharge cycles.

\*As a general rule 'Users' should note that the number of cycles is dependent upon the dept of discharge, load and charging regime.

### 3 - 5 YEARS STANDARD COMMERCIAL

This group of batteries is at the consumer end of standby applications and are popular in small emergency equipment.

### 6 - 9 YEARS GENERAL PURPOSE

This group of batteries is usually used when an improved life is required in comparison to the Standard Commercial product, and also in cases where operational conditions are more severe.

### 10/12 YEARS LONG LIFE

This group of batteries is used where high power, long life and high reliability are required.

### > 12 YEARS VERY LONG LIFE

This group of batteries is used in applications where longest life and highest reliability are required.

## SAFETY

### FLAMMABILITY

Some 'users' have operational procedures that require the use of flame retardant plastics materials to a defined rating.

The battery manufacturer shall indicate the category of flame retardancy in accordance with the test methods FV: flame vertical specimen of IEC 60707. This method introduces three categories fo flame retardancy, FV0, FV1 and FV2. The FV0 category is the most resistant to flame propagation.

For the purposes of this publication, the flammability characteristics of valve regulated lead-acid batteries are classified as follows:

S = Standard flammability rating FV1, FV2 or lower.

H = High premium flammability rating FV0.

### EMISSION

In normal conditions of use, gas emissions for valve regulated lead-acid batteries are considerably lower than flooded batteries. Ventilation of battery rooms or cabinets shall be according to EN 50272-2.

### INTERNAL RESISTANCE AND SHORT CIRCUIT CURRENTS

Internal resistance can be important to the equipment design and operation. The manufacturer shall state the value of internal resistance for a new battery.

# OPERATIONAL RECOMMENDATIONS

## SERVICE LIFE

The service life is the value, which is established on the basis of field experience under optimised conditions, describing the time in which a specified capacity or power can be used (optimum application and operating conditions have to be specified). Should the battery be required to perform the full specified discharge duty cycle throughout its life, then a 125% factor for age should be applied in the initial battery size calculation.

## FACTORS AFFECTING SERVICE LIFE

Service life is strongly related to the working conditions of the battery.

## AMBIENT TEMPERATURE

Operation of valve regulated lead acid batteries on float at temperatures higher than 20°C reduces the battery life expectancy, with 50% life reduction per 10°C constant increase of the temperature. However adjustment of the float voltage according to the ambient temperature might reduce this effect. More information should be available in the manufacturers' specification or operating guide.

In case of elevated ambient temperature float voltage compensation is recommended. Reference should be made to the Manufacturer's recommendations. Temperatures higher than 40°C can produce ever increasing float current values which can create a thermal runaway condition and cause premature failure of the battery.

## FLOAT CHARGE RIPPLE

Excessive ripple on the D.C. supply

across a battery has the effect of reducing life and performance. It is recommended therefore that voltage regulation across the system including the load, shall be better than +/- 1% through 5% to 100% load, without the battery connected and under steady state of conditions. Transient and other ripple type excursions can be accommodated provided that, with the battery disconnected but the load connected, the system peak to peak voltage, including the regulation limits, falls within +/- 2.5% of the recommended float voltage of the battery. Under no circumstances should the current flowing through the battery when it is operating under float conditions, reverse into the discharge mode.

## FLOAT STABILISATION RIPPLE

This form of ripple arises where the demands of the load are out of phase with the capabilities of the rectifier, and the battery is used to stabilise the system.

Some static UPS systems behave in this manner, and the condition is more like shallow cycling.

In these circumstances, normal battery characteristics no longer apply, and the manufacturer should provide the optimum operational conditions.

## DEEP DISCHARGING

It is recommended that at the discretion of the user, low voltage disconnect features should be used in connected equipment.

It is however recognised that there may be circumstances, particularly for system safety reasons, where the requirements for maximum performance would preclude the use of a low voltage disconnect feature.

# INSTALLATION AND COMMISSIONING

Cells and batteries should be installed, commissioned and operated in accordance with:

- Manufacturer's Recommendations/ Instructions.
- European Standard EN 50272-2 Safety requirements for secondary batteries and battery installations – Part 2: Stationary batteries.
- Regional/National/ Local Standards for the Environment.

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## EUROBAT

EUROBAT, the Association of European Automotive and Industrial Battery Manufacturers, acts as a unified voice in promoting the interests of the European automotive, industrial and special battery industries of all battery chemistries to the EU institutions, national governments, customers and the media.

With over 40 members comprising over 90% of the automotive and industrial battery industry in Europe, EUROBAT also works with stakeholders to help develop a vision of future battery solutions to issues of public interest in areas like e-mobility and renewable energy storage.



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